

Mandan, N.D., facility provides intriguing research

By Connie Sieh Groop
Farm Forum Editor

Sometimes you just get overwhelmed. That happened to me recently when I visited the Northern Great Plains Research Center in Mandan, N.D.

When I first started as the editor of the Farm Forum, I had no idea of what went on at this facility which is part of the Agricultural Research Service, an arm of the United States Department of Agriculture.

Most farmers I know, work hard and don't have the time to concentrate on the whys associated with their crops growing taller, new ways to treat diseases in the soil or the way nutrients pass through the cow's intestinal tract. Those questions are taken seriously at Mandan. Established in 1914, the Northern Great Plains Research lab exists to take agricultural problems and work out solutions. With a staff of scientists, Dr. Jon Hanson directs the work at the facility.

This group is excited about seeking answers that will make farming and ranching practices better. They use scientific tools to examine the minute details of farming to produce alternative and sometimes better ways to do things.

Cal Thorson, technical informational specialist for the North Dakota center, provided me with an intense schedule to meet the scientists to learn about their projects. (Shown on Page 45.) I learned more than I thought was possible during that trip. The scope of the work is fascinating. I met individually and in groups to get briefing from the scientists. Many of the projects work in conjunction with each other in this integrated system. Some have been the subject of stories in national and regional farm publications.

The concept of scientists many times conjures up images of men in white coats in a locked room. Not so at this place. These scientists do have a lab where

This is the campus of the Northern Great Plains Research Center in Mandan, N.D.

testing is done but the facility has a 35-acre research campus in addition to the 2,400 acres. Grains are grown, rangeland is monitored and cattle are checked as the scientists seek answers to questions posed by the ag community.

Integrated approach

I had lunch with Jon Hanson, director of the laboratory. In talking about the facility, he emphasized to me that projects start in the field, and are not dictated by Washington, D.C. The focus on projects comes from an advisory board that meets with the scientists.

Hanson noted that the age of specialization is over, especially in central and western Dakotas.

The idea used to be that raising crops and livestock had become so complicated that specialization was essential. That doesn't ring true anymore.

"Diversification is again profitable," Hanson says. "NGPRL is focusing on helping farmers and ranchers figure out ways to diversify profitability. They have several projects aimed at enabling crop producers to bring livestock back into their operations. Research ranges from developing a feeding program to raise the healthy omega-3 levels in meat to perfecting a low-cost swath grazing program for wintering cows."

He's enthusiastic about all of the projects and is thrilled that NGPRL has distributed the 11,000th copy of the CD with their Crop Sequence Calculator.

(See explanation below.)

Despite impressive achievements in feeding a population of more than six billion people, there are concerns about the sustainability of modern agriculture. According to Hanson, "Intensive agriculture impacts the resource base and potentially reduces both its capacity and its sustainability. In the Great Plains, many cropping systems are characterized by a lack of diversity and declines in soil organic carbon. At the same time, beef production in the United States has done an excellent job of developing animals that can efficiently convert feed grains into meat acceptable for human consumption (i.e. feedlots), but as a result it is heavily dependent on fossil fuels."

Here are summaries of just a few of the projects that were presented to me:

Checking out potentials

Dr. Don Tanaka and Dr. Joe Krupinsky explained the background and reasoning behind development of the 'Crop Sequence Calculator' (CSC). The tool is designed to help producers assess crop production and the potential returns of ten crops (barley, bean, canola, crambe, flax, pea, safflower, soybean, sunflower, and wheat) as part of a diverse cropping system.

The information gives farmers the opportunity to try out different scenarios for their operations. The CSC runs directly from a CD-ROM eliminating the need for additional disk space or installation pro-

cedures. By typing in expected crop prices and expected loan deficiency payments, rapid calculations of potential returns are shown. By clicking the 'More Info' buttons adjacent to each summary, research results, management principles, photographs, graphs, and additional information are easily accessed. For example, additional information for plant diseases includes an introduction to plant diseases, plant disease research results, websites for additional plant disease information, and photographs of plant diseases to aid in their identification.

"This project really was a huge experiment. It was labor intensive and challenged the staff but it was very important to get it into the hands of the producers. We have now distributed 11,000 copies to colleges and farmers. The lab is committed to continually updating the program," according to Hanson.

Healthy beef

In another of the projects, scientist Scott Kronberg concentrates on improving the healthiness of beef which is a big issue for society. He is directing his efforts to enrich the meat by feeding flaxseed in conjunction with other crops.

"One of the big challenges is to keep the good nutrients from being destroyed while going through the digestive system of the cows," according to Kronberg. "This involves trying different techniques in providing feed to the cattle and then watching how they react. We observe how well they eat as

well as chart the levels of Omega-3 in their blood. Trials have been done to combine the flax feedings with millet, corn and alfalfa plus molasses to make it more palatable."

"We're also looking at how it affects the marbling of the meat," he says. "We make adjustments such as adding Vitamin E to the grain to enhance the taste of the beef. I would predict that there will be more and more branded beef as people put more emphasis on what they are eating."

In conjunction with Kronberg, Eric Scholljegerdes is setting up a metabolism barn.

"We're looking at the effect on natural forages on cattle," Scholljegerdes said. "We're using a window-type device in the side of the cows to watch how the nutrients go through the system. We take samples and evaluate that back in the lab."

Scholljegerdes uses technology by using cannulated cows in his ruminant research to look at the nutrients of natural grasslands and how the forage is utilized. He's extending that to look at the effects of that nutrition on reproduction. "We're looking at the energy balance which has the most pronounced effort on fertility and manipulates body growth."

More info available

In doing this story, I hope that my notes will help people across the Farm Forum coverage area understand some of the research in ag science that is being done in this region. This is just one of the ARS locations where researchers are looking for ways to improve efforts in farming and ranching.

The scientists have published their research in scientific journals. In addition, summaries of what they are working on also appear in the Northern Great Plains Integrator, the newsletter published by the facility. To get on the mailing list, contact Cal Thorson at 701-667-3018 or email

thorsonc@mandan.ars.usda.gov. You can also contact the lab for more information by writing to NGPRL, P.O. Box 459, Mandan, ND 58552 or go to www.mandan.ars.usda.gov.

Cal provided me with a great deal of background information and some of that is used in summarizing the projects.



Photo from Northern Great Plains Research Center

Faces behind research at Northern Plains Research Lab

Lab Director

Jon Hanson is Laboratory Director (LD) for the Northern Great Plains Research Laboratory (NGPRL) and Research Leader (RL) and Supervisory Rangeland Scientist for the Natural Resources Management Unit at Mandan, N.D. He received his Ph.D. in Range Science from Texas A&M University in 1979. Jon began his career with ARS at the High Plains Grassland Research Station in Cheyenne, Wyoming in 1979.



Hanson

Research Geneticist

John Berdahl is a Research Geneticist working on breeding and genetics of forage grasses and alfalfa for dryland use. John received a Ph.D. in Plant Breeding and Genetics from the University of Minnesota in 1970. John was hired by ARS at Mandan in 1976 where he has provided expertise in breeding and genetics to a multidisciplinary team involved in developing grass and alfalfa cultivars and germplasm with improved seedling vigor, forage and seed yields, nutritional quality, drought and disease resistance, winterhardiness, and sustained productivity. The primary goal is to develop improved forages for dryland crop-forage-livestock systems that will complement native rangeland and help to provide a consistent supply of high quality forage over an extended grazing season. John led research that resulted in the recent release of 'Reliant' and 'Manska' intermediate wheatgrass and 'Mankota' Russian wildrye.



Berdahl

Rangeland Scientist

Prior to coming to Mandan, John Hendrickson was a Rangeland Scientist with the USDA-ARS in Dubois, Idaho where he worked on the effects of grazing on the plant community, carbon dioxide sequestration in rangelands



Hendrickson

and using grazing to control noxious weeds. John received his bachelors in agriculture from the University of Nebraska in 1984. After a term in the Peace Corps, John received his masters in from the University of Nebraska in 1992. He received his Ph.D. from Texas A&M in Rangeland Ecology and Management in 1996. His long-term goals are to develop range and forage systems that are economically viable and promote long-term agricultural stability.

Research Animal Scientist

Scott Kronberg started working at NGPRL in October of 2000. He was on the faculty at South Dakota State University in the Department of Animal and Range Sciences for 7 years before that. He began this work while a graduate student and research assistant at Montana State University in the early 1980s and continued it as a graduate student and research assistant with Utah State University.

Scott has also worked as a post-doctoral research associate at Montana State University and at the ARS's sheep research station near Dubois, Idaho. Scott plans to continue his research in ruminant nutrition and feeding behavior in respect to helping develop integrated crop and livestock production systems.



Kronberg

Research Plant Pathologist

Dr. Krupinsky is a plant pathologist at Mandan, ND. Dr. Krupinsky received his M.S. from the Univ. of Maryland, College Park, MD and his Ph.D. from Montana State Univ., Bozeman, MT. He spent six years at USDA-ARS, Beltsville Agricultural Research Center, Beltsville, MD, five years at USDA-ARS, Montana State Univ., Bozeman, MT, and has been at the Northern Great Plains Research Laboratory since 1977.

Dr. Krupinsky conducts plant disease research associated with diverse cropping systems and grasses for forage production. His research on grasses has identified new diseases, developed techniques for selection of disease resis-



Krupinsky

tant germplasm, and with colleagues has documented the effects of diseases on forage quality and ascertained the heritability/inheritance of disease resistance. His research has included extensive work with foliar diseases of wheat such as tan spot.

Soil Scientist

Mark Liebig works with a multidisciplinary team of scientists to develop soil, crop, and animal management practices for the northern Great Plains to overcome limitations to productivity while maintaining or enhancing environmental quality. As a team member, he is responsible for determining the effects of diverse cropping and integrated agricultural systems on soil quality and greenhouse gas flux.



Liebig

Soil Microbiologist

Kris Nichols received a Bachelor of Science degree in Plant Biology, and Genetics and Cell Biology from the University of Minnesota in 1995. She began her career with ARS in 1999 while completing her Masters degree in Environmental Microbiology from West Virginia University. That same year, she began to work on a Ph.D. program in Soil Science at the University of Maryland. She received her doctorate degree in December 2003. Nichols worked at the USDA-ARS Beltsville Agricultural Research Center in Maryland where she was engaged in studying a plant root symbiont. Her most recent work involves the investigation of glomalin – a substance produced by AM fungi. Glomalin contributes to soil structure and plant health by helping to form and stabilize soil aggregates. Along with



Nichols

About the Agricultural Research Service

The Northern Plains Area Office of the Agricultural Research Service is located in Fort Collins, Colo. Included are Colorado, Wyoming, Utah, Nebraska, Kansas, North Dakota, South Dakota, and Montana.

Research locations include Akron, Colo.; Brookings, S.D.; Cheyenne, Wyo. / Ft Collins, Colo.; Clay Center, Neb.; Fargo, N.D.; Grand Forks, N.D.; Laramie, Wyo.; Lincoln, Neb.; Logan, Utah; Mandan, N.D.; Manhattan, Kan.; Miles City, Mont. and Sidney, Mont.

ARS is the U.S. Department of Agriculture's chief in-house scientific research agency. Nationwide, there are 1,200 research projects within 22 National Programs that employ 2,100 scientists and 6,000 other employees in 100 research locations including a few in other countries with a \$1.1 billion fiscal year 2005 budget

continuing that research, Kris will be the primary researcher in the development of native prairie grasses for potential biofuel production.

Soil Scientist

Steve Merrill began work at the NGPRL in 1977. From 1966 to 1977, Steve worked at the USDA-ARS U.S. Salinity Laboratory in Riverside, California. Steve received his bachelor's degree in physics and a masters degree in biology at Dartmouth College, N.H. He continued his graduate work at the University of California at Riverside where he obtained his doctoral degree in soil science. Steve's current research interests include theory and measurement for multi-scalar soil erosion processes, response of diverse crop species to variant soil and land types and to variant soil quality properties, crop residue and soil surface roughness effects on soil erosion hazard, dynamics of soil hydrology and crop water use, root growth of alternative crop species including legumes, and wind erodibility of cropping systems.



Merrill

Plant Physiologist

Dr. Rebecca Phillips began Plant Physiologist duties at NGPRL in June 2005. Her duties include working on rangeland plant physiology and carbon sequestration. Phillips earned a B.S. in Biology and Physical Science at the Mississippi University for Women, an M.S. in Ecological Studies at Colorado State University, Phillips and a Ph.D. at the University of North Carolina. She served as a post-doc at the University of Michigan's School of Natural Resources.

Phillips moved to NGPRL from the Atmospheric Sci-



ences Department at the University of North Dakota's John D. Odegard School of Aerospace Science. Her previous research projects include rangeland plant-animal interactions, soil microbial metabolism and community structure, organic and precision agriculture greenhouse gas flux and carbon cycling, greenhouse gas exchange, and agricultural remote sensing.

Research Animal Scientist

Eric Scholljegerdes started working at Mandan in January of 2005. Eric received his B. S. in Animal Science from the University of Missouri-Columbia in 1998. Eric moved to the University of Wyoming to complete his M. S. in 2001. Eric went to the University of Wyoming and obtained his Ph. D. in 2005. Eric's dissertation research evaluated how dietary fat could influence the fatty acid profile of reproductive tissues in beef cows. He intends to continue researching how nutritional inputs can influence animal performance and carcass composition.



Scholljegerdes

Soil Scientist

Dr. Donald Tanaka's research has focused on developing and conducting long-term research on dryland conservation tillage-crop production systems and residue management for sustainable agricultural systems that conserve the soil and water resource of the northern Great Plains. Research results stress the importance of high-residue management systems for environmentally acceptable use of the soil and water resource.



Tanaka

Information taken from ARS website